

Progress Report & Roadmap CP3

Multicolored Multiplexers

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Progress Report

Functionalities Implemented/Work Completed

For this checkpoint, we implemented a static not taken branch predictor to support control instructions and flush the pipeline whenever mispredicted commits occur. Additionally we integrated 2 caches (instruction & data) with competition memory with support for memory instructions through a load/store queue.

Division of Labor

Our group met multiple times in the past week, mostly in person in the DCL. Division of labor was mainly done by people choosing what they were most comfortable with to code. Lots of time was spent trying to analyze design decisions and through texting, progress updates, decision decisions, and questions were discussed and documented.

1. Control instructions: (Soumil, J)
2. Memory instructions: (Tyler, Soumil)
3. Cache Integration: (Tyler, J)

Testing Strategies

We decided to split into 2 separate branches after connecting the competition memory to our caches, one for static not taken branch predictors, and the other for implementing a load/store queue to support memory instructions. For both branches we have several assembly files to test the functionality of each, before merging and eventual testing with coremark.

Current Datapath

<https://drive.google.com/file/d/1KogmaMYfLVObvLSIMb3sGG44uEM9Bqb/view?usp=sharing>

Roadmap

Planned Progress in Functionalities

Week of 4/1:

1. Add branch logic
2. Add load/store logic (non-speculative for beginning)
3. Debug to get coremark working

Week of 4/8: 411 MT2 Also. Buffer week in the case.

1. EC: Ensure Superscalar works
2. EC: All arithmetic extensions
3. EC: Write next-line prefetching and debug

Week of 4/15:

1. EC: Write Stride Prefetcher and debug
2. EC: Write a Perceptron Branch Predictor, and Debug
3. EC: Write a GShare branch Predictor and Debug

Week of 4/22:

1. EC: Post-Commit Store Buffer
2. EC: Cocotb
3. EC: Non-synthesizable model
4. Write Report
5. Prepare for Presentation

Planned Division of Labor for Next 2 Weeks

(Advanced Features & Superscalar Integration):

List of All Intended Advanced Features:

1. 2-Way Superscalar - Soumil, Tyler (20 Hrs)
2. Write Coalescing - Tyler (20 Hrs)
3. Stride Prefetcher - Tyler (10 Hrs)
4. Next-Line Prefetcher - Tyler (10 Hrs)
5. TAGE Predictor - Jay (25 Hrs)
6. GShare Predictor - Soumil, Jay (20 Hrs)
7. Multiplication And Division Extensions - Jay (15 Hrs)
8. Non-Synthesizable Model - Soumil (20 Hrs)
9. Cocotb - Soumil (15 Hrs)
10. Kissing Men - Soumil, Tyler